

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371

Mo-6389/LeA 33,465

U.S. APPLICATION NO. (If known, use 37 CFR 1.5)

09/868126

To Be Assigned

INTERNATIONAL APPLICATION NO.

INTERNATIONAL FILING DATE

PRIORITY DATE CLAIMED

PCT/EP99/09693

December 9, 1999

December 21, 1998

TITLE OF INVENTION NOVEL POLYMER BLENDS WITH MOULD-RELEASE AGENTS

APPLICANT(S) FOR DO/EO/US REITZE, Burkhard; ZIMMERMANN, Raimund and HAESE, Wilfried

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☒ is attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ has been communicated by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
 - a. ☐ is attached hereto.
 - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ have been communicated by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A FIRST preliminary amendment.
14. ☐ A SECOND or SUBSEQUENT preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information:

Abstract

U.S. APPLICATION NO. (if known) **09/868126**
To Be AssignedINTERNATIONAL APPLICATION NO
PCT/EP99/09693ATTORNEY'S DOCKET NUMBER
Mo-6389/LeA 33,46521. ☒ The following fees are submitted:

CALCULATIONS PTO USE ONLY

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):Neither international preliminary examination fee (37 CFR 1.482)
nor international search fee (37 CFR 1.445(a) (2)) paid to USPTO
and International Search Report not prepared by the EPO or JPO **\$1000.00**International preliminary examination fee (37 CFR 1.482) not paid to
USPTO but International Search Report prepared by the EPO or JPO **\$860.00**International preliminary examination fee (37 CFR 1.482) not paid to USPTO
but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **\$710.00**International preliminary examination fee (37 CFR 1.482) paid to USPTO
but all claims did not satisfy provisions of PCT Article 33(1)-(4) **\$690.00**International preliminary examination fee (37 CFR 1.482) paid to USPTO
and all claims satisfied provisions of PCT Article 33(1)-(4) **\$100.00****ENTER APPROPRIATE BASIC FEE AMOUNT =**

\$ 860.00

Surcharge of **\$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30
months from the earliest claimed priority date (37 CFR 1.492(e)).

\$ 0.00

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total claims	28 -20 =	8	x \$18.00	\$ 144.00
Independent claims	1 -3 =	0	x \$80.00	\$ 0.00
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$270.00	\$ 0.00

TOTAL OF ABOVE CALCULATIONS = \$ 1,004.00☐ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above
are reduced by 1/2.

\$ 0.00

SUBTOTAL = \$ 1,004.00Processing fee of **\$130.00** for furnishing the English translation later than ☐ 20 ☐ 30
months from the earliest claimed priority date (37 CFR 1.492(f)).

\$ 0.00

TOTAL NATIONAL FEE = \$ 1,004.00Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be
accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **\$40.00** per property +

\$ 40.00

TOTAL FEES ENCLOSED = \$ 1,044.00Amount to be
refunded: \$

charged: \$

- a. ☐ A check in the amount of \$ _____ to cover the above fees is enclosed.
- b. ☒ Please charge my Deposit Account No. 13-3848 in the amount of \$ 1,044.00 to cover the above fees.
A duplicate copy of this sheet is enclosed.
- c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any
overpayment to Deposit Account No. 13-3848. A duplicate copy of this sheet is enclosed.
- d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card
information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR
1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO

SIGNATURE

James R. Franks
NAME42,552
REGISTRATION NUMBER

09/868126
JC03 Rec'd PCT/PTO 14 JUN 2001

PATENT APPLICATION
Mo-6389
LeA 33,465

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION OF)
BURKHARD REITZE ET AL) PCT/EP99/09693
SERIAL NUMBER: TO BE ASSIGNED)
FILED: HEREWITH)
TITLE: NOVEL POLYMER BLENDS WITH)
MOULD-RELEASE AGENTS)

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

This preliminary amendment is being filed concurrently with the subject patent application. Upon granting a Serial Number and filing date, please amend the subject patent application as follows.

"Express Mail" mailing label number ET146895042US
Date of Deposit June 14, 2001

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Assistant Commissioner of Patents and Trademarks, Washington, D.C. 20231

Dorothy P. Colangelo
(Name of person mailing paper or fee)

Dorothy P. Colangelo
Signature of person mailing paper or fee

Please amend the Application as follows.

IN THE ABSTRACT:

Please add the following abstract on a separate page.

--NOVEL POLYMER BLENDS WITH MOULD-RELEASE AGENTS

ABSTRACT OF THE DISCLOSURE

A thermoplastic polymer mixture comprising at least one thermoplastic polycarbonate polymer, and at least one mold release agent including at least one polyol component, is described. At least one polyol component (I) of the mold release agent consists of a parent substance with at least 4 carbon atoms, at least 3 hydroxyl groups, at least one hydroxyl group esterified with an aliphatic carboxylic acid, and at least one free hydroxyl group.--

A separate abstract page is included herewith.

IN THE SPECIFICATION:

Please replace the title on line 2 of page 1 with the following.

--NOVEL POLYMER BLENDS WITH MOULD-RELEASE AGENTS--

Please insert the following between lines 2 and 4 on page 1 of the specification.

--CROSS REFERENCE TO RELATED PATENT APPLICATIONS

The present patent application claims the right of priority under 35 U.S.C. 119 and 35 U.S.C. 365 of International Application No. PCT/EP99/09693, filed 9 December 1999, which was published in German as International Patent Publication No. WO 00/37550 on 29 June 2000, which is entitled to the right of priority of German Patent Application No. 198 59 050.4, filed 21 December 1998.

FIELD OF THE INVENTION--

Please insert the following at line 10 on page 1 of the specification.

--BACKGROUND OF THE INVENTION--

Please insert the following at line 28 on page 3 of the specification.

--SUMMARY OF THE INVENTION--

Please insert the following at line 13 on page 4 of the specification.

--DETAILED DESCRIPTION OF THE INVENTION--

IN THE CLAIMS:

Please cancel Claim 11 without prejudice.

Please add the following Claims 13-29.

--13. The thermoplastic mixtures of Claim 2 wherein the parent substance contains 4 to 8 carbon atoms.

14. The thermoplastic mixtures of Claim 2 wherein the parent substance contains 5, 6 or 7 carbon atoms.

15. The thermoplastic mixtures of Claim 2 wherein the parent substance contains 5 or 6 carbon atoms.

16. The thermoplastic mixtures of Claim 2 wherein the parent substance contains 5 carbon atoms.

17. The thermoplastic mixtures of Claim 3 wherein the aliphatic carboxylic acids are selected from C_5 - C_{25} fatty acids and mixtures thereof.

18. The thermoplastic mixtures of Claim 3 wherein the aliphatic carboxylic acids are selected from C_8 - C_{24} fatty acids and mixtures thereof.

19. The thermoplastic mixtures of Claim 3 wherein the aliphatic carboxylic acids are selected from C_{12} - C_{22} fatty acids and mixtures thereof.

20. The thermoplastic mixtures of Claim 3 wherein the aliphatic carboxylic acids are selected from C_{16} - C_{20} fatty acids and mixtures thereof.

21. The thermoplastic mixtures of Claim 3 wherein the aliphatic carboxylic acids are selected from C₁₆-C₁₈ fatty acids and mixtures thereof.

22. The thermoplastic mixtures of Claim 4 wherein the polyol component (I) is present in amounts of 0.01 wt. % to 0.2 wt. %.

23. The thermoplastic mixtures of Claim 4 wherein the polyol component (I) is present in amounts of 0.015 wt. % to 0.1 wt. %.

24. The thermoplastic mixtures of Claim 4 wherein the polyol component (I) is present in amounts of 0.02 wt. % to 0.08 wt. %.

25. The thermoplastic mixtures of Claim 8 wherein the proportion of polyol components with less than one free hydroxyl group or polyol components with less than two esterified hydroxyl groups in the entire mould release agent are each less than 20 wt. %.

26. The thermoplastic mixtures of Claim 8 wherein the proportion of polyol components with less than one free hydroxyl group or polyol components with less than two esterified hydroxyl groups in the entire mould release agent are each less than 15 wt. %.

27. The thermoplastic mixtures of Claim 8 wherein the proportion of polyol components with less than one free hydroxyl group or polyol components with less than two esterified hydroxyl groups in the entire mould release agent are each less than 10 wt. %.

28. The thermoplastic mixtures of Claim 10 wherein said polycarbonate is selected from copolymers of bisphenol A with trimethylcyclohexyl bisphenol containing 5 to 50 wt. % of trimethylcyclohexyl bisphenol.

29. The moulded articles of Claim 12 wherein said moulded articles are selected from compact discs and DVDs.--

Please replace Claim 1 with the following.

1. (Once Amended, Clean) Thermoplastic polymer mixtures comprising:
at least one polycarbonate; and at least one mould release agent with at least one polyol component; wherein at least one polyol component (I) of said mould release agent consists of a parent substance with 4 or more carbon atoms, 3 or more hydroxyl groups, more than one hydroxyl group esterified with aliphatic carboxylic acids, and one or more free hydroxyl groups.

Please replace Claim 2 with the following.

2. (Once Amended, Clean) The thermoplastic polymer mixtures of Claim 1 wherein the parent substance contains 4 to 12 carbon atoms.

Please replace Claim 3 with the following.

3. (Once Amended, Clean) The thermoplastic polymer mixtures of Claim 1 wherein the aliphatic carboxylic acids are selected from C₂-C₃₀ fatty acids and mixtures thereof.

Please replace Claim 4 with the following.

4. (Once Amended, Clean) The thermoplastic polymer mixtures of Claim 1 wherein the polyol component (I) is present in amounts of 0.005 wt. % to 0.5 wt. %.

Please replace Claim 5 with the following.

5. (Once Amended, Clean) The thermoplastic polymer mixtures of Claim 1 wherein in polyol component (I), a carbon atom with a hydrogen substituent is not located immediately adjacent to a carbon atom with hydroxyl groups.

Please replace Claim 6 with the following.

6. (Once Amended, Clean) The thermoplastic polymer mixtures of Claim 1 wherein in polyol component (I), the number of esterified and of free hydroxyl groups is the same.

Please replace Claim 7 with the following.

7. (Once Amended, Clean) The thermoplastic polymer mixtures of Claim 1 wherein the ratio of the amount of polyol component (I) in the mould release agent to other optionally present components in the mould release agent is greater than 1:1.

Please replace Claim 8 with the following.

8. (Once Amended, Clean) The thermoplastic polymer mixtures of Claim 1 wherein the proportion of polyol components with less than one free hydroxyl group or polyol components with less than two esterified hydroxyl groups in the entire mould release agent are each less than 24 wt. %.

Please replace Claim 9 with the following.

9. (Once Amended, Clean) The thermoplastic polymer mixtures of Claim 1 further comprising at least one additive selected from stabilisers, flame retardants, antistatic agents, fillers, foaming agents and colorants.

Please replace Claim 10 with the following.

10. (Once Amended, Clean) The thermoplastic polymer mixtures of Claim 1 wherein said polycarbonate is selected from homopolymers of bisphenol A and copolymers of bisphenol A with trimethylcyclohexyl bisphenol.

Please replace Claim 12 with the following.

12. (Once Amended, Clean) Moulded articles made from the thermoplastic polymer mixtures of Claim 1.

REMARKS

Claims in the case are 1-10 and 12-29, upon entry of the present amendment. Claim 11 has been canceled, Claims 13-29 have been added, and Claims 1-10 and 12 have been amended herein.


Claims 1-10 and 12 of the above-identified patent application have been amended as to form, for example, by introducing indefinite and definite articles, introducing indentation, replacing "characterized in that" with --wherein--, and converting multi-dependent claims to singly dependent claims.

Basis for added Claims 13-16 is found in original Claim 2, and at page 8, lines 1-5 of the specification. Basis for added Claims 17-21 is found in original Claim 3, and at page 9, lines 7-11 of the specification. Basis for added Claims 22-24 is found in original Claim 4, and at page 9, lines 23-25 of the specification. Basis for added Claims 25-27 is found in original Claim 8, and at page 10, lines 1-6 of the specification. Basis for added Claim 28 is found in original Claim 10, and at page 6, lines 4-7 of the specification. Basis for added Claim 29 is found in original Claim 12, and at page 11, lines 6-9 of the specification.

The title of the specification has been amended herein to correspond to the related International Patent Publication No. WO 00/37550. The specification has been amended to include section headings, in accordance with accepted practice before the Office. The cross reference information inserted on page 1 of the specification, is presented in accordance with 37 C.F.R. 1.78(a)(2) (Federal Register / Vol. 65, No. 183 / Wednesday, September 20, 2000; Changes to Implement Eighteen-Month Publication of Patent Applications; Final Rule). An abstract of the patent application is included herewith on a separate page.

The amendments presented herein do not represent the entry of new matter into the application. Applicants respectfully request entry of this Preliminary Amendment.

Respectfully submitted,

By 
James R. Franks
Agent for Applicants
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VERSIONS WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION: (Marked-Up)

The following are changes and additions made to the specification.

The following is a version of the title on line 2 of page 1 showing changes made thereto by amendment herein.

[Novel polymer mixtures with mould release agents] NOVEL POLYMER BLENDS
WITH MOULD-RELEASE AGENTS

The following has been inserted between lines 2 and 4 on page 1 of the specification.

CROSS REFERENCE TO RELATED PATENT APPLICATIONS

The present patent application claims the right of priority under 35 U.S.C. 119 and 35 U.S.C. 365 of International Application No. PCT/EP99/09693, filed 9 December 1999, which was published in German as International Patent Publication No. WO 00/37550 on 29 June 2000, which is entitled to the right of priority of German Patent Application No. 198 59 050.4, filed 21 December 1998.

FIELD OF THE INVENTION

The following has been added at line 10 on page 1 of the specification.

BACKGROUND OF THE INVENTION

The following has been added at line 28 on page 3 of the specification.

SUMMARY OF THE INVENTION

The following has been added at line 13 on page 4 of the specification.

DETAILED DESCRIPTION OF THE INVENTION

IN THE CLAIMS: (Marked-Up)

The following are versions of the amended claims with markings to show changes made thereto in the present Preliminary Amendment.

1. (Once Amended, Marked-Up) Thermoplastic polymer mixtures [containing]
comprising:

at least one polycarbonate; and

at least one mould release agent with at least one polyol component;[,
characterised in that]

wherein at least one polyol component (I) of said mould release agent consists of a
parent substance with 4 or more carbon atoms, 3 or more hydroxyl groups, more
than one hydroxyl group esterified with aliphatic carboxylic acids, and one or
[preferably] more [than one] free hydroxyl groups.

2. (Once Amended, Marked-Up) The [T]thermoplastic polymer mixtures
[according to] of Claim 1[, characterised in that] wherein the parent substance
contains 4 to 12 carbon atoms[, preferably 4 to 8 carbon atoms, particularly
preferably 5,6 or 7 carbon atoms, very particularly preferably 5 or 6 carbon atoms
and even more preferably 5 carbon atoms].

3. (Once Amended, Marked-Up) The [T]thermoplastic polymer mixtures
[according to at least one of the preceding Claims, characterised in that] of Claim 1
wherein the aliphatic carboxylic acids are selected from C₂-C₃₀ fatty acids and
mixtures thereof[, preferably C₅-C₂₅ fatty acids, preferably C₈-C₂₄ fatty acids,
particularly preferably C₁₂-C₂₂ fatty acids, very particularly preferably C₁₆-C₂₀ fatty
acids and even more preferably C₁₆-C₁₈ fatty acids or mixtures of these fatty acids].

4. (Once Amended, Marked-Up) The [T]thermoplastic polymer mixtures
[according to at least one of the preceding Claims, characterised in that] of Claim 1
wherein the polyol component (I) is [used] present in amounts of 0.005 wt. % to 0.5
wt. %[, preferably 0.01 wt. % to 0.2 wt. %, very particularly preferably 0.015 wt. % to
0.1 wt. %, and even more preferably 0.02 wt. % to 0.08 wt. %].

5. (Once Amended, Marked-Up) The [T]thermoplastic polymer mixtures
[according to at least one of the preceding Claims, characterised in that,] of Claim 1
wherein in polyol component (I), a carbon atom with a hydrogen substituent is not
located immediately adjacent to a carbon atom with hydroxyl groups.

6. (Once Amended, Marked-Up) The [T]thermoplastic polymer mixtures [according to at least one of the preceding Claims, characterised in that,] of Claim 1 wherein in polyol component (I), the number of esterified and of free hydroxyl groups is the same.

7. (Once Amended, Marked-Up) The [T]thermoplastic polymer mixtures [according to at least one of the preceding Claims, characterised in that] of Claim 1 wherein the ratio of the amount of polyol component (I) in the mould release agent to other optionally present components in the mould release agent is greater than 1:1.

8. (Once Amended, Marked-Up) The [T]thermoplastic polymer mixtures [according to at least one of the preceding Claims, characterised in that] of Claim 1 wherein the proportion of polyol components with less than one free hydroxyl group or polyol components with less than two esterified hydroxyl groups in the entire mould release agent are each less than 24 wt. %[, preferably less than 20 wt. %, particularly preferably less than 15 wt. % and even more preferably less than 10 wt. %].

9. (Once Amended, Marked-Up) The [T]thermoplastic polymer mixtures [according to at least one of the preceding Claims, characterised in that] of Claim 1 [in addition other ingredients and/or] further comprising at least one additive[s conventionally used in polycarbonate mixtures such as e.g. preferably] selected from stabilisers, flame retardants, antistatic agents, fillers, foaming agents[, and colorants [etc. are present].

10. (Once Amended, Marked-Up) The [T]thermoplastic polymer mixtures [according to at least one of the preceding Claims, characterised in that] of Claim 1 wherein [at least one polycarbonate is present which contains bisphenol A and/or trimethylcyclohexyl bisphenol (TMC) as diol blocks, preferably being chosen from the group of] said polycarbonate is selected from homopolymers of bisphenol A[, and copolymers of bisphenol A with trimethylcyclohexyl bisphenol [TMC or copolymers with 5 to 50 wt.% of TMC].

11. (Cancelled)

12. (Once Amended, Marked-Up) Moulded [items] articles made from the thermoplastic polymer mixtures [according to at least one of Claims 1 to 10,] of Claim 1 [preferably for optical applications, particularly preferably for optical data carriers, very particularly preferably compact discs and DVDs].

13. (Added) The thermoplastic mixtures of Claim 2 wherein the parent substance contains 4 to 8 carbon atoms.

14. (Added) The thermoplastic mixtures of Claim 2 wherein the parent substance contains 5, 6 or 7 carbon atoms.

15. (Added) The thermoplastic mixtures of Claim 2 wherein the parent substance contains 5 or 6 carbon atoms.

16. (Added) The thermoplastic mixtures of Claim 2 wherein the parent substance contains 5 carbon atoms.

17. (Added) The thermoplastic mixtures of Claim 3 wherein the aliphatic carboxylic acids are selected from C₅-C₂₅ fatty acids and mixtures thereof.

18. (Added) The thermoplastic mixtures of Claim 3 wherein the aliphatic carboxylic acids are selected from C₃-C₂₄ fatty acids and mixtures thereof.

19. (Added) The thermoplastic mixtures of Claim 3 wherein the aliphatic carboxylic acids are selected from C₁₂-C₂₂ fatty acids and mixtures thereof.

20. (Added) The thermoplastic mixtures of Claim 3 wherein the aliphatic carboxylic acids are selected from C₁₆-C₂₀ fatty acids and mixtures thereof.

21. (Added) The thermoplastic mixtures of Claim 3 wherein the aliphatic carboxylic acids are selected from C₁₆-C₁₈ fatty acids and mixtures thereof.

22. (Added) The thermoplastic mixtures of Claim 4 wherein the polyol component (I) is present in amounts of 0.01 wt. % to 0.2 wt. %.

23. (Added) The thermoplastic mixtures of Claim 4 wherein the polyol component (I) is present in amounts of 0.015 wt. % to 0.1 wt. %.

24. (Added) The thermoplastic mixtures of Claim 4 wherein the polyol component (I) is present in amounts of 0.02 wt. % to 0.08 wt. %.

25. (Added) The thermoplastic mixtures of Claim 8 wherein the proportion of polyol components with less than one free hydroxyl group or polyol components with less than two esterified hydroxyl groups in the entire mould release agent are each less than 20 wt. %.

26. (Added) The thermoplastic mixtures of Claim 8 wherein the proportion of polyol components with less than one free hydroxyl group or polyol components with less than two esterified hydroxyl groups in the entire mould release agent are each less than 15 wt. %.

27. (Added) The thermoplastic mixtures of Claim 8 wherein the proportion of polyol components with less than one free hydroxyl group or polyol components with less than two esterified hydroxyl groups in the entire mould release agent are each less than 10 wt. %.

28. (Added) The thermoplastic mixtures of Claim 10 wherein said polycarbonate is selected from copolymers of bisphenol A with trimethylcyclohexyl bisphenol containing 5 to 50 wt. % of trimethylcyclohexyl bisphenol.

29. (Added) The moulded articles of Claim 12 wherein said moulded articles are selected from compact discs and DVDs.

NOVEL POLYMER BLENDS WITH MOULD-RELEASE AGENTS**ABSTRACT OF THE DISCLOSURE**

A thermoplastic polymer mixture comprising at least one thermoplastic polycarbonate polymer, and at least one mold release agent including at least one polyol component, is described. At least one polyol component (I) of the mold release agent consists of a parent substance with at least 4 carbon atoms, at least 3 hydroxyl groups, at least one hydroxyl group esterified with an aliphatic carboxylic acid, and at least one free hydroxyl group.--

09/868126

- 1 -

JC03 Rec'd PCT/PTO 14 JUN 2001

Novel polymer mixtures with mould release agents

5 The present invention provides thermoplastic polymer mixtures containing at least one mould release agent with a polyol component consisting of a parent substance with 4 or more carbon atoms, 3 or more hydroxyl groups, more than one hydroxyl group esterified with aliphatic C₁-C₃₂ carboxylic acids and one or more than one free hydroxyl group, the use of such polyol components as mould release agents for thermoplastic polymer mixtures and moulded items made from these thermoplastic polymer mixtures.

10 When processing thermoplastic polymer mixtures, the production of moulded parts some of which have extremely complicated spatial shapes is a main application. Mould release agents are added to the polymer mixture itself or placed in the machines during processing in order to ensure, or simplify still further, removal of the moulded parts
15 from the mould. In addition, these are intended to improve the surface quality.

The disadvantage of this procedure is contamination of the product with additives which can have a detrimental effect on the moulded item during preparation, storage or use.

20 Esters of long chain fatty acids with hydroxy components, in particular glycerine, have proven useful in the prior art.

DE-OS-20 64 095 describes the addition to polycarbonates of fatty acid esters of trihydric alcohols as mould release agents.

25 DE-OS-25 07 748 describes the improvement in the mould release characteristics of polycarbonates due to the addition of polyalcohols completely esterified with fatty acids.

30 "Express Mail" mailing label number ET146395042US
Date of Deposit June 14, 2001

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Assistant Commissioner of Patents and Trademarks, Washington, D.C. 20231

Dorothy P. Colangelo
(Name of person mailing paper or fee)

Dorothy P. Colangelo
Signature of person mailing paper or fee

33 46

- 2 -

DE-OS 27 01 725 describes the addition of part-esters of specific alcohols to polycarbonates for the purpose of mould release.

JP-A-45-24 439 describes the addition to polycarbonates of part-esters in amounts of
5 0.05 to 5 % for the purpose of mould release.

JP-A-72-45 934 describes antistatic-modified polycarbonates with 0.1 to 5 wt.% of fatty acid monoglycerides.

10 JP-A-60-81 245 describes the addition of part-esters to low-chlorine polycarbonates in order to prevent corrosion of the moulds.

JP-A-2-225 558 describes polycarbonate sheets which contain part-esters of polyols and aliphatic monocarboxylic acids.
15

Japanese patent application 90-12-510 describes substrates for CDs which consist of polycarbonate and contain 0.002 to 5 % of fatty acid monoglycerides.

Japanese patent application 90-294 979 describes polycarbonates for optical discs which
20 contain 0.06 to 0.09 % of glycerine monostearate.

US 4,131,575 describes the addition to polycarbonates of full esters of polyhydric alcohols or monoesters of polyhydric alcohols, to improve mould release.

25 US 4,743,641 describes the addition of glycerine monostearate, diglyceride monostearate, glycerine monopalmitate or sorbitane monostearate to polycarbonates.

EP-A-205 192 describes polycarbonate mixtures to which has been added esters of glycerine and of pentaerythritol. Glycerine monostearate is preferred in that document.
30

- 3 -

EP-A-213 413 describes the addition of part-esters to polycarbonates for optical purposes.

5 EP-A-417 775 describes moulded items for optics made of polycarbonates which contain fatty acid monoglycerides.

EP-A-511 640 also describes the addition of part-esters to polycarbonates for optical purposes.

10 EP-A-732 360 describes polycarbonate mixtures with mixtures of glycerine monostearate and glycerine tristearate.

15 The mould release agents in the prior art, such as for example the frequently used glycerine monostearate, have the disadvantage that they can lead to reactions with the polycarbonate. This impairs the thermal and oxidative resistance of the materials which may be expressed, for example, by yellowing. This is undesirable, in particular for optical applications of polycarbonate. This applies in particular to processing processes which involve high thermal stress for the material or for applications which require special optical quality. The mechanical properties of the polymer may also be modified
20 undesirably as a result of these reactions. In addition coatings may appear on parts of the machines.

In the case of fully esterified alcohol components, the mould release characteristics are inadequate.

25

There is therefore a constant demand for novel mould release agents for thermoplastic polymers such as, for example, polycarbonate and/or polycarbonate blends.

30 The object therefore consists of developing a mould release agent for polycarbonates which has a very low, or even zero, tendency to react under the conditions of

preparation and processing, especially during the preparation of products for optical applications such as compact discs and digital versatile discs (DVDs), have a good mould release effect and thus lead to improved quality and higher data security in the case of optical applications. This is achieved by polymer mixtures according to the invention.

Accordingly, the present application provides thermoplastic polymer mixtures containing at least one polycarbonate and at least one mould release agent with at least one polyol component wherein at least one polyol component (I) consists of a parent substance with 4 or more carbon atoms, 3 or more, preferably 4 or more, hydroxyl groups, more than one hydroxyl group esterified with aliphatic carboxylic acids and one or preferably more than one free hydroxyl group.

Thermoplastic aromatic polycarbonates in the context of the present invention are either homopolycarbonates or copolycarbonates; the polycarbonates may be linear or branched in a known manner.

These polycarbonates are prepared in a known manner from diphenols, carbonic acid derivatives, optional chain stoppers and optional branching agents.

Details of the preparation of polycarbonates have been presented in many patent documents over the last 40 years. By way of example, reference is made here only to Schnell, "Chemistry and Physics of Polycarbonates", Polymer Reviews, volume 9, Interscience Publishers, New York, London, Sydney, 1964, to D. Freitag, U. Grigo, P.R. Müller, H. Nouvertne', BAYER AG, "Polycarbonates" in Encyclopedia of Polymer Science and Engineering, volume 11, 2nd edition, 1988, pages 648-718 and finally to Drs. U. Grigo, K. Kirchner and P.R. Müller "Polycarbonate" in Becker/Braun, Kunststoff-Handbuch, vol. 3/1, Polycarbonate, Polyacetale, Polyester, Celluloseester, Carl Hanser Verlag, Munich, Vienna 1992, pages 117-299.

Suitable diphenols for preparing polycarbonates are, for example, hydroquinone, resorcinol, dihydroxydiphenyls, bis-(hydroxyphenyl)-alkanes, bis-(hydroxyphenyl)-cycloalkanes, bis-(hydroxyphenyl)-sulfides, bis-(hydroxyphenyl)-ethers, bis-(hydroxyphenyl)-ketones, bis-(hydroxyphenyl)-sulfones, bis-(hydroxyphenyl)-sulfoxides, α,α' -bis-(hydroxyphenyl)-diisopropylbenzenes, and their ring-alkylated and ring-halogenated compounds.

Preferred diphenols are 4,4'-dihydroxydiphenyl, 2,2-bis-(4-hydroxyphenyl)-propane, 2,4-bis-(4-hydroxyphenyl)-2-methylbutane, 1,1-bis-(4-hydroxyphenyl)-p-diisopropylbenzene, 2,2-bis-(3-methyl-4-hydroxyphenyl)-propane, 2,2-bis-(3-chloro-4-hydroxyphenyl)-propane, bis-(3,5-dimethyl-4-hydroxyphenyl)-methane, 2,2-bis-(3,5-dimethyl-4-hydroxyphenyl)-propane, bis-(3,5-dimethyl-4-hydroxyphenyl)-sulfone, 2,4-bis-(3,5-dimethyl-4-hydroxyphenyl)-2-methylbutane, 1,1-bis-(3,5-dimethyl-4-hydroxyphenyl)-p-diisopropylbenzene, 2,2-bis-(3,5-dichloro-4-hydroxyphenyl)-propane, 2,2-bis-(3,5-dibromo-4-hydroxyphenyl)-propane, 1,1-bis-(4-hydroxyphenyl)-3,3,5-trimethylcyclohexane and 4,4'-(m-phenylenediisopropylidene)-diphenol.

Particularly preferred diphenols are 2,2-bis-(4-hydroxyphenyl)-propane (BPA), 2,2-bis-(3,5-dimethyl-4-hydroxyphenyl)-propane, 2,2-bis-(3,5-dichloro-4-hydroxyphenyl)-propane, 2,2-bis-(3,5-dibromo-4-hydroxyphenyl)-propane, 4,4'-(m-phenylene-diisopropylidene)-bisphenol (CAS No: 13595-25-0) (BPM), 1,1-bis-(4-hydroxyphenyl)-cyclohexane and 1,1-bis-(4-hydroxyphenyl)-3,3,5-trimethylcyclohexane (TMC).

These and other suitable diphenols are described, for example, in US-PS 3 028 635, 2 999 835, 3 148 172, 2 991 273, 3 271 367, 4 982 014 and 2 999 846, in German patent documents 1 570 703, 2 063 050, 2 036 052, 2 211 956 and 3 832 396, in French patent document 1 561 518, in the monograph "H. Schnell, Chemistry and Physics of Polycarbonates, Interscience Publishers, New York 1964" and in Japanese patent documents 62039/1986, 62040/1986 and 105550/1986.

In the case of homopolycarbonates, only one diphenol is used; in the case of copolycarbonates, several diphenols are used.

5 Polymer mixtures which contain at least one polycarbonate with diol blocks made from bisphenol A and/or trimethylcyclohexyl bisphenol (TMC) are preferably used, preferably those chosen from the group of homopolymers of bisphenol A, copolymers of bisphenol A with TMC or of copolymers with 5 to 50 wt.% of TMC.

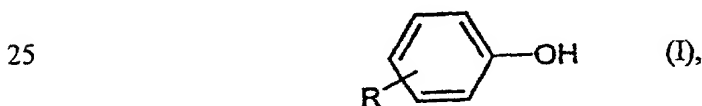
10 Suitable carbonic acid derivatives are, for example, phosgene or diphenyl carbonate.

Suitable chain stoppers are either monophenols or monocarboxylic acids. Suitable monophenols are phenol itself, alkylphenols such as cresols, p-tert.-butylphenol, p-n-octylphenol, p-iso-octylphenol, p-n-nonylphenol and p-iso-nonylphenol, halogenophenols such as p-chlorophenol, 2,4-dichlorophenol, p-bromophenol, 15 amylphenol and 2,4,6-tribromophenol and mixtures of these.

Preferred chain stoppers are phenol and/or p-tert.-butylphenol and/or p-cumylphenol.

20 Suitable monocarboxylic acids are benzoic acid, alkylbenzoic acids and halogenobenzoic acids.

Preferred chain stoppers are phenols of the formula (I)



in which R is hydrogen, tert.-butyl or a branched or unbranched C₈ and/or C₉ alkyl group. However, p-cumylphenol may also preferably be used.

30

The amount of chain stopper to be used, preferably in a phase interface process, is 0.1 mol.% to 5 mol.%, with respect to the particular diphenols used. The addition of chain stoppers may take place before, during or after phosgenation.

- 5 Suitable branching agents are the trifunctional or more than trifunctional compounds known from polycarbonate chemistry, in particular those with three or more than three phenolic OH groups.

10 Suitable branching agents are, for example, phloroglucine, 4,6-dimethyl-2,4,6-tri-(4-hydroxyphenyl)-hept-2-ene, 4,6-dimethyl-2,4,6-tri-(4-hydroxyphenyl)-heptane, 1,3,5-tri-(4-hydroxyphenyl)-benzene, 1,1,1-tri-(4-hydroxyphenyl)-ethane, tri-(4-hydroxyphenyl)-phenylmethane, 2,2-bis-[4,4-bis-(4-hydroxyphenyl)-cyclohexyl]-propane, 2,4-bis-(4-hydroxyphenyl-isopropyl)-phenol, 2,6-bis-(2-hydroxy-5'-methyl-benzyl)-4-methyl-phenol, 2-(4-hydroxyphenyl)-2-(2,4-dihydroxyphenyl)-propane, hexa-
15 (4-(4-hydroxyphenyl-isopropyl)-phenyl orthoterephthalate, tetra-(4-hydroxyphenyl)-methane, tetra-(4-(4-hydroxyphenyl-isopropyl)-phenoxy)-methane and 1,4-bis-(4',4"-dihydroxytriphenyl)-methyl)-benzene and also 2,4-dihydroxybenzoic acid, trimesic acid, cyanuric chloride and for a few applications even preferably 3,3-bis-(3-methyl-4-hydroxyphenyl)-2-oxo-2,3-hydroindole.

20

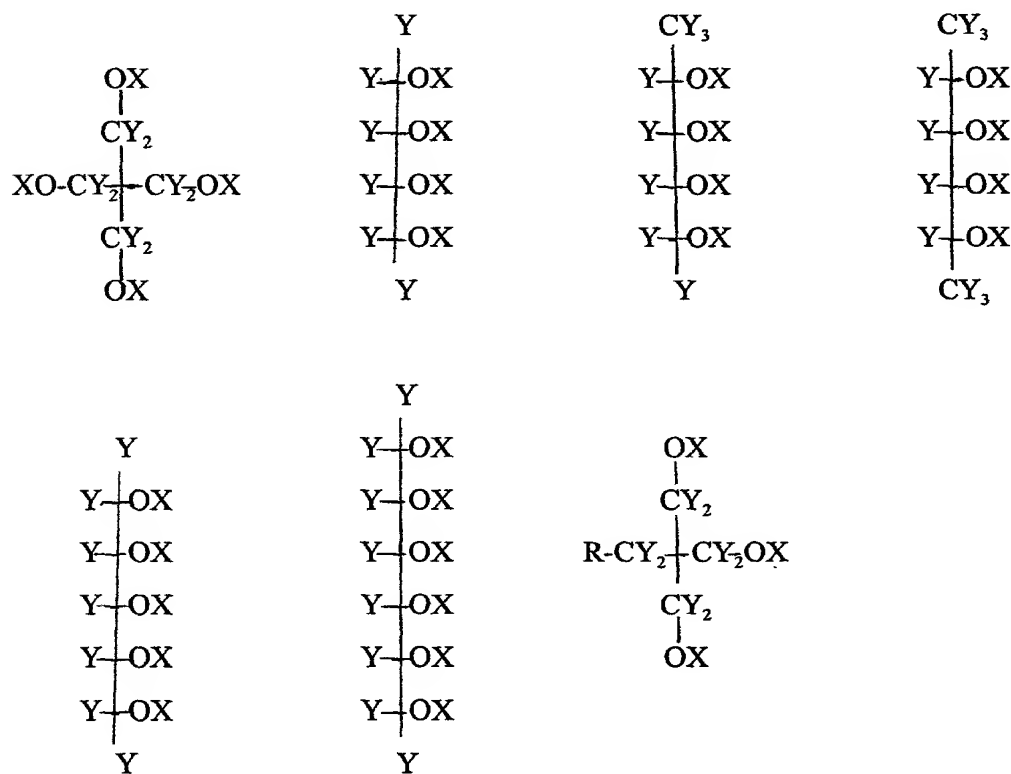
The amount of optionally used branching agent is 0.05 mol.% to 2 mol.%, again with respect to the particular diphenols used.

25 The branching agent may either be initially introduced to the phase interface process in the aqueous alkaline phase with the diphenols and the chain stoppers or may be added dissolved in an organic solvent. In the case of a transesterification process, the branching agent is used together with the diphenols.

30 All these steps for preparing thermoplastic polycarbonates are familiar to a person skilled in the art.

Polyol components which can be used according to the invention are those with 4 to 12 carbon atoms, preferably 4 to 8 carbon atoms, particularly preferably 5, 6 or 7 carbon atoms, very particularly preferably 5 or 6 carbon atoms and even more preferably 5

Polyol components (I) with the following general formulae are preferred:



in which the substituents X, independently, are hydrogen atoms or aliphatic acyl groups, with the proviso that more than one X is an acyl group and more than one X is a hydrogen atom, and R is a hydrogen atom or a linear or branched C₁ to C₁₀ alkyl group, preferably methyl, ethyl or propyl.

The groups Y, independently, are hydrogen atoms, alkyl or aryl groups, wherein hydrogen atoms, methyl, ethyl, propyl, butyl and phenyl groups are preferred. Hydrogen atoms and methyl groups are particularly preferred. It is very particularly preferred that a carbon atom with a hydrogen substituent is not located immediately adjacent to a carbon atom with hydroxyl groups.

Preferred acyl groups X are fatty acid ester groups with 2 to 30 carbon atoms, particularly preferably C_5 - C_{25} fatty acids, very particularly preferably C_8 - C_{24} fatty acids and even more preferably C_{12} - C_{22} fatty acid and mixtures of these. A person skilled in the art finds the best examples among C_{16} - C_{20} fatty acids, more preferably C_{16} - C_{18} fatty acids and mixtures of these.

Examples of such acyl groups are groups from acetic acid, propionic acid and butyric acid and also groups from myristic acid, palmitic acid or stearic acid, arachidic acid and behenic acid and mixtures of these, preferably mixtures of stearic acid and palmitic acid.

Polyol components in which the number of esterified and free hydroxyl groups is the same are preferred.

Preferred polyol components are diester derivatives of pentaerythritol, in particular diesters of pentaerythritol with stearic acid.

Polyol component (I) may be used in amounts of 0.005 wt.% to 0.5 wt.%, preferably 0.01 wt.% to 0.2 wt.%, very particularly preferably 0.015 wt.% to 0.1 wt.% and even more preferably 0.02 wt.% to 0.08 wt.%.

The polyol component may be used either as an individual substance or as a mixture of two or more polyol components and/or other components. The ratio of the amount of polyol component (I) in the mould release agent to other optionally present components in the mould release agent is preferably greater than 1:1.

A person skilled in the art obtains good results when the proportion of polyol components with less than one free hydroxyl group or polyol components with less than two esterified hydroxyl groups in the entire mould release agent are each less than 24
5 wt.%, preferably less than 20 wt.%, particularly preferably less than 15 wt.% and even more preferably less than 10 wt.%.

Conventional additives may be added, in known amounts, to the thermoplastic polycarbonates to be removed from moulds in accordance with the invention, for
10 example stabilisers against the effects of heat, moisture and UV radiation, such as phosphorus compounds (such as phosphoric acid, phosphates, phosphites, phosphonites, etc.), optionally combined with monomeric or polymeric epoxides, N-containing heterocyclic compounds such as triazoles or benzotriazoles, also flame retardants such as
15 aliphatic or aromatic or perfluorinated aliphatic alkali metal or alkaline earth metal sulfonates, colorants, fillers, foaming agents, and antistatic agents. In the case of optical applications, those components which do not impair the transparency of the material are preferred.

Addition of the polyol component to the thermoplastic polycarbonates may take place,
20 for example, by adding the polyol component during working up of the polymer solution of the thermoplastic polycarbonates or of the melt of the thermoplastic polycarbonates; addition preferably takes place when compounding the final, thermoplastic polycarbonates.

Conventional additives which are known for use with polycarbonates may be admixed
25 in a known manner either before addition of the polyol component, when adding the polyol component or after addition of the polyol component to the polycarbonates.

The invention also provides use of polyol components (I) as mould release agents for
30 thermoplastic polymer mixtures containing at least one polycarbonate.

The invention also provides moulded items made from the thermoplastic polymer mixtures mentioned above, preferably for optical applications, particularly preferably for optical data carriers, very particularly preferably for compact discs and DVDs.

5

Polycarbonates which are easy to remove from moulds, in accordance with the invention, may be further processed in the ways known for polycarbonates for optical applications, particularly preferably for optical data carriers, very particularly preferably compact discs and DVDs.

10

This processing may take place as a separate step using finally prepared polycarbonates which are easy to remove from moulds and which are obtained for example as granules. Processing may also take place, however, after incorporation of the polyol component and/or conventional additives.

15

T 0 0 7 5 5 0 " 9 2 7 8 3 6 0

Examples

The following mixture was prepared:

5 **Example 1:**

99.96 wt.% polycarbonate granules of bisphenol-A-PC with tert.butylphenol terminal
groups and an average solution viscosity of 1.20 (measured in methylene
chloride at 25°C and a concentration of 0.5 g in 100 ml of methylene
10 chloride)

0.04 wt.% Loxiol EP 728 (fatty ester diester of pentaerythritol), Henkel KGaA

and intensively mixed in a sealed container. Then the mixture was compounded on a
15 twin-screw compounder of the Werner Pfleiderer ZSK 53 type at a bulk temperature of
about 240°C.

Comparison example 1 (without a mould release agent):

20 Polycarbonate granules of bisphenol-A-PC with tert.butylphenol terminal groups and an
average solution viscosity of 1.20 (measured in methylene chloride at 25°C and a
concentration of 0.5 g in 100 ml of methylene chloride) were compounded on a twin-
screw compounder of the Werner Pfleiderer ZSK 53 type at a bulk temperature of about
240°C.

25

Comparison example 2 (with glycerine monostearate):

The following mixture was prepared:

30

99.96 wt.% polycarbonate granules of bisphenol-A-PC with tert.butylphenol terminal groups and an average solution viscosity of 1.20 (measured in methylene chloride at 25°C and a concentration of 0.5 g in 100 ml of methylene chloride)

5

0.04 wt.% Loxiol EP 129 (glycerine monostearate), Henkel KGaA

and intensively mixed in a sealed container. Then the mixture was compounded on a twin-screw compounder of the Werner Pfleiderer ZSK 53 type at a bulk temperature of about 240°C.

10

Comparison example 3 (with pentaerythrityl stearate):

The following mixture was prepared:

15

Example 1:

99.96 wt.% polycarbonate granules of bisphenol-A-PC with tert.butylphenol terminal groups and an average solution viscosity of 1.20 (measured in methylene chloride at 25°C and a concentration of 0.5 g in 100 ml of methylene chloride)

20

0.04 wt.% Loxiol P 861/3.5 (tetraester of pentaerythritol), Henkel KGaA

and intensively mixed in a sealed container. Then the mixture was compounded on a twin-screw compounder of the Werner Pfleiderer ZSK 53 type at a bulk temperature of about 240°C.

30

Measuring the static friction:

Static friction is the frictional index which is derived from the force required to set in motion bodies which are stationary with respect to each other (plunger / test item).

5

The coefficient of static friction is defined as follows:

$$F_R = \mu * F_N \quad (\text{equ. 1})$$

10 after rearranging: $\mu = F_R / F_N$ (equ. 2)

F_N = normal force, F_R = frictional force, μ = coefficient of friction

In the case of circular motion, the following relationship applies: $F_R = M_d / r_m$ (equ. 3)

15 M_d = torque, r_m = average radius of area of friction (ring area)

$$M_d / r_m = \mu * F_N \quad (\text{equ. 4})$$

after rearranging: $\mu = M_d / (r_m * F_N)$ (equ. 5)

20

In a special coefficient of friction mould, a disc-shaped test item with an outer diameter of 92 mm and a thickness of 2.6 mm is prepared. This has a 5 mm high and 3 mm wide ridge at the outer edge, on which are located flat indentations, comparable to a toothed belt disc, whereby the torque is transferred from the mould to the test item.

25

This enables direct determination of the coefficient of static friction (equ. 5) of a disc-shaped test item, immediately after it has solidified. The relationship that the frictional force is proportional to the torque (equ. 3) is used here. On opening the mould, a plunger connected to a torque sensor and with a defined normal force F_N against the moulded part (friction partner) is introduced. On the other face of the moulded part, the

30

test item is held in place and set in rotation. The coefficient of static friction between the plunger and the test item is determined from the torque measured at the plunger. Since the friction is caused by the unevenness of the surfaces slipping past each other (hooking into each other), the plunger was designed with an average surface roughness

5 Ra = 0.05 μm .

The materials (material 1 and comparison material 1, comparison material 2 and comparison material 3) were melted in an injection moulding machine and injected into the sealed coefficient of friction mould with a wall temperature of 100°C at a melt

10 temperature of 300°C and retained for a period of 15 sec at a follow-up pressure of 550 bar.

After a residual cooling time of 20 sec, the mould was opened very slightly and the coefficient of friction was determined.

15

The following values were obtained:

Material	Coefficient of static friction μ_0
Material 1	0.82
Comparison material 1	1.07
Comparison material 2	0.72
Comparison material 3	1.04

It can be seen that with a small concentration of mould release agent only the product according to the invention and the comparison product with glycerine monostearate as

20 mould release agent clearly lower the static friction.

Measuring product stability when producing CDs:

25 To measure the product stability, CD crude mouldings were prepared on a CD injection

- 16 -

moulding machine of the Netsal Discjet 600 type using material 1 and comparison material 2 described above, these having a thickness of 1.2 mm and an outer diameter of 120 mm. In order to avoid scattering and diffraction of light in the colorometric measurements, a polished cavity plate without a pit structure was used.

5 Processing of the materials took place with different machine settings:

Setting 1: Cylinder temperatures (feed end / compression / cylinder head / nozzle)
315 / 320 / 320 / 320 °C maximum rate of injection 130 mm/sec mould
(initial temperature) 55°C; cycle time 4.6 sec.

10

Setting 2: Cylinder temperatures (feed end / compression / cylinder head / nozzle)
315 / 340 / 350 / 350 °C maximum rate of injection 110 mm/sec mould
(initial temperature) 55°C; cycle time 4.9 sec.

15

Setting 3: Cylinder temperatures (feed end / compression / cylinder head / nozzle)
315 / 360 / 380 / 380 °C maximum rate of injection 100 mm/sec mould
(initial temperature) 55°C; cycle time 5.5 sec.

20

Setting 4: Corresponding to setting 2, wherein however the cycle is interrupted by a
5 minute machine stoppage. Each fifth disc after re-starting the injection
moulding machine was used for the following measurements.

The melt viscosity, the yellowness index, the concentration of phenolic OH groups and
the concentration of free tert.-butylphenol of the CD crude mouldings were measured.

25

The following values were obtained:

Table 1

Melt viscosity in Pa*s (300°C/1000 s ⁻¹)				
Sample	Setting 1 (320°C)	Setting 2 (350°C)	Setting 3 (380°C)	Setting 4 (350°C + stop)
Material 1	66	66	65	65
Comparison material 2	63	63	63	61

Table 2

Yellowness index YI according to ASTM E 313				
Sample	Setting 1 (320°C)	Setting 2 (350°C)	Setting 3 (380°C)	Setting 4 (350°C + stop)
Material 1	1.02	1.02	1.02	1.38
Comparison material 2	1.10	1.16	1.18	1.48

5

Table 3

Phenolic OH in ppm				
Sample	Setting 1 (320°C)	Setting 2 (350°C)	Setting 3 (380°C)	Setting 4 (350°C + stop)
Material 1	110	115	125	130
Comparison material 2	120	130	135	145

Table 4

Free p-tert.-butylphenol in ppm				
Sample	Setting 1 (320°C)	Setting 2 (350°C)	Setting 3 (380°C)	Setting 4 (350°C + stop)
Material 1	6	6	8	11
Comparison material 2	9	11	19	20

Description of the methods of measurement in detail:

- a) Melt viscosity measurement in high-pressure capillary viscometer
- 5 The CD crude mouldings are cut into 6 to 8 mm strips and dried for 16 h at 110°C under vacuum. Then the strips are inserted into a test channel heated to 300°C (diameter 10 mm), melted and pushed with a plunger through a nozzle with a diameter of 1 mm and a length of 20 mm with a rate of shear of 1000 s⁻¹.
- 10 b) Yellowness index YI according to ASTM E 313
- The measurement was made perpendicular to the surface of the CD at a radius of 40 mm.
- 15 c) Phenolic OH
- 20 The polycarbonate is dissolved in dichloromethane and titanium (IV) chloride is added, whereupon an orange-red complex is formed. The extinction of this complex is determined photometrically at 546 nm. Calibration is performed with bisphenol A as an external standard. The limit of determination is about 20 ppm OH.
- d) Free p-tert.-butylphenol
- 25 10 g of polycarbonate are dissolved in methylene chloride and precipitated with acetone and methanol. The precipitated polymer is filtered off and the residual solution is concentrated down to about 20 ml. Then the solution is analysed using high-pressure liquid chromatography.
- 30

- 19 -

Chromatographic conditions: Reverse phase: C18; mobile solvent: water/acetonitrile (50 %); flow: 1 ml/min; wavelength: 220 nm.

5 The test results demonstrate advantages for the material according to the invention in all the properties measured.

PCT/EP99/09693

Claims

1. Thermoplastic polymer mixtures containing at least one polycarbonate and at least one mould release agent with at least one polyol component, characterised in that at least one polyol component (I) consists of a parent substance with 4 or more carbon atoms, 3 or more hydroxyl groups, more than one hydroxyl group esterified with aliphatic carboxylic acids and one or preferably more than one free hydroxyl group.
2. Thermoplastic polymer mixtures according to Claim 1, characterised in that the parent substance contains 4 to 12 carbon atoms, preferably 4 to 8 carbon atoms, particularly preferably 5,6 or 7 carbon atoms, very particularly preferably 5 or 6 carbon atoms and even more preferably 5 carbon atoms.
3. Thermoplastic polymer mixtures according to at least one of the preceding Claims, characterised in that the aliphatic carboxylic acids are C_2 - C_{30} fatty acids, preferably C_5 - C_{25} fatty acids, preferably C_8 - C_{24} fatty acids, particularly preferably C_{12} - C_{22} fatty acids, very particularly preferably C_{16} - C_{20} fatty acids and even more preferably C_{16} - C_{18} fatty acids or mixtures of these fatty acids.
4. Thermoplastic polymer mixtures according to at least one of the preceding Claims, characterised in that polyol component (I) is used in amounts of 0.005 wt.% to 0.5 wt.%, preferably 0.01 wt.% to 0.2 wt.%, very particularly preferably 0.015 wt.% to 0.1 wt.%, and even more preferably 0.02 wt.% to 0.08 wt.%.
5. Thermoplastic polymer mixtures according to at least one of the preceding Claims, characterised in that, in polyol component (I), a carbon atom with a hydrogen substituent is not located immediately adjacent to a carbon atom with hydroxyl groups.

6. Thermoplastic polymer mixtures according to at least one of the preceding Claims, characterised in that, in polyol component (I), the number of esterified and of free hydroxyl groups is the same.
- 5 7. Thermoplastic polymer mixtures according to at least one of the preceding Claims, characterised in that the ratio of the amount of polyol component (I) in the mould release agent to other optionally present components in the mould release agent is greater than 1:1.
- 10 8. Thermoplastic polymer mixtures according to at least one of the preceding Claims, characterised in that the proportion of polyol components with less than one free hydroxyl group or polyol components with less than two esterified hydroxyl groups in the entire mould release agent are each less than 24 wt.%, preferably less than 20 wt.%, particularly preferably less than 15 wt.% and even more preferably less than 10 wt.%.
15
9. Thermoplastic polymer mixtures according to at least one of the preceding Claims, characterised in that in addition other ingredients and/or additives conventionally used in polycarbonate mixtures such as e.g. preferably stabilisers, flame retardants, antistatic agents, fillers, foaming agents, colorants etc. are present.
20
10. Thermoplastic polymer mixtures according to at least one of the preceding Claims, characterised in that at least one polycarbonate is present which contains bisphenol A and/or trimethylcyclohexyl bisphenol (TMC) as diol blocks, preferably being chosen from the group of homopolymers of bisphenol A, copolymers of bisphenol A with TMC or copolymers with 5 to 50 wt.% of TMC.
25
- 30

11. Use of polyol components (I) from at least one of Claims 1 to 6 as mould release agents for thermoplastic polymer mixtures containing at least one polycarbonate.
12. Moulded items made from thermoplastic polymer mixtures according to at least one of Claims 1 to 10, preferably for optical applications, particularly preferably for optical data carriers, very particularly preferably compact discs and DVDs.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name. I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought

on the invention entitled

"NOVEL POLYMER BLENDS WITH MOULD-RELEASE AGENTS"

the specification of which is attached hereto,

or was filed on **December 9, 1999**

as a PCT Application Serial No. **PCT/EP99/09693**

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s), the priority(ies) of which is/are to be claimed:

198 59 050.4
(Number)

Germany
(Country)

December 21, 1998
(Month/Day/Year Filed)

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose the material information as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)	(Filing Date)	(Status)
		(patented, pending, abandoned)

(Application Serial No.)	(Filing Date)	(Status)
		(patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

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RESIDENCE		CITIZENSHIP	
POST OFFICE ADDRESS			
FULL NAME OF SEVENTH INVENTOR		INVENTOR'S SIGNATURE	DATE
RESIDENCE		CITIZENSHIP	
POST OFFICE ADDRESS			